

SUBSPECIES AND GEOGRAPHIC DISTRIBUTION OF
BLACK-MANTLE TAMARINS *SAGUINUS*
NIGRICOLLIS SPIX (PRIMATES: CALLITRICHIDAE)

Philip Hershkovitz

Abstract.—A new subspecies from Colombia of the black-mantle tamarin, *Saguinus nigricollis*, is distinguished from *S. n. nigricollis* and *S. n. graellsii* by color pattern. Geographic range of each of the three subspecies is revised and discussed, and differentiation of the taxa during early Recent-Late Pleistocene is hypothesized on the basis of past climates.

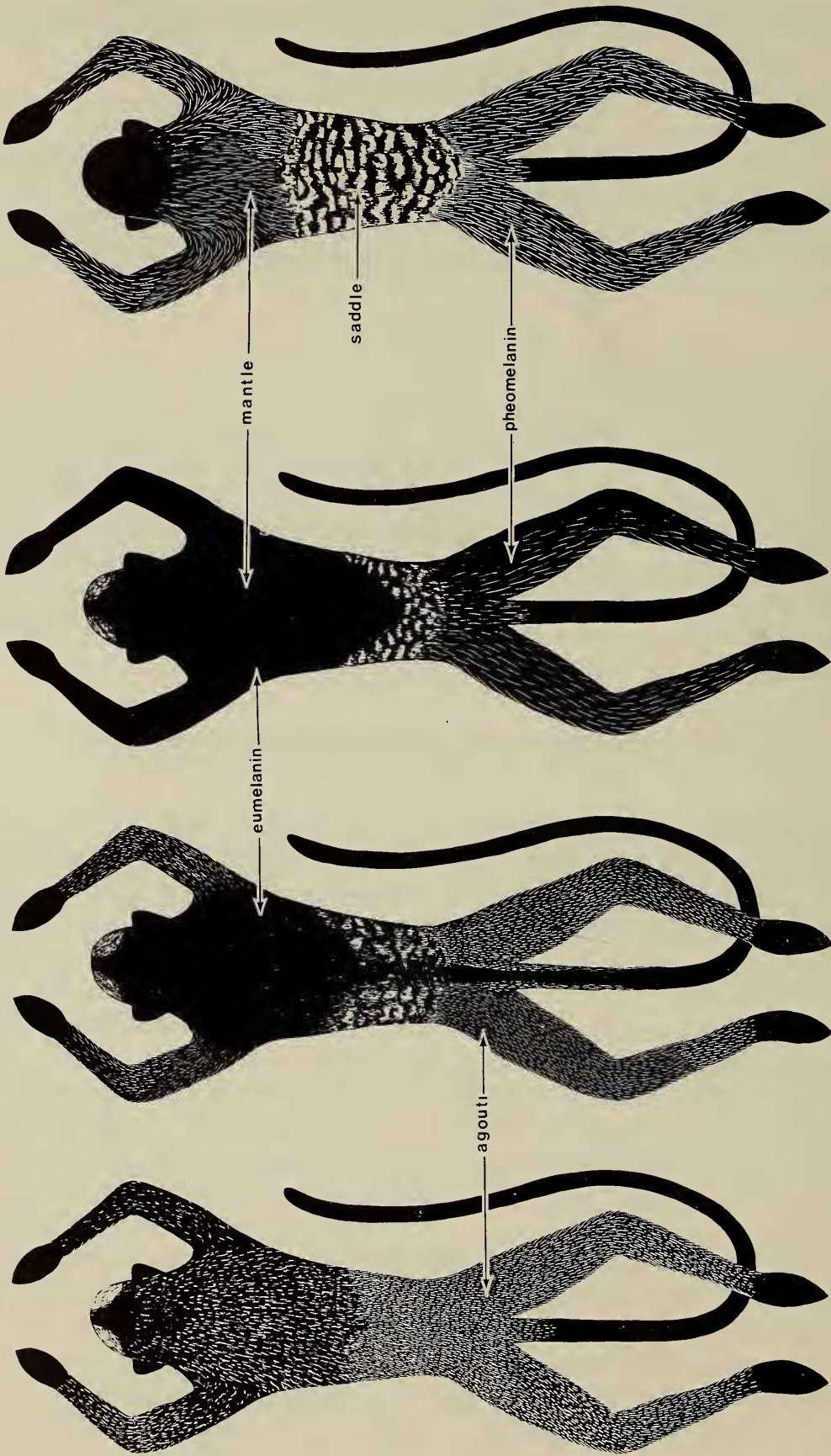
Description of a new subspecies of black-mantle tamarin, herein named *Saguinus nigricollis hernandesi*, entails some modifications of my 1977 account of the species. As previously noted (Hershkovitz 1977:618, 626) no single character or combination of characters other than color and color pattern consistently distinguishes any species or subspecies of tamarin of the *Saguinus nigricollis* group. The distinctive color patterns of each of the three presently recognized races of *Saguinus nigricollis* are given in the following key. For use of color and color pattern terminology see Hershkovitz (1977:91-101).

Key to Subspecies of the Black-mantle Tamarin
(Fig. 1)

1. Nape and mantle blackish or dark brown (eumelanin) agouti, the mantle more or less square behind and not extending beyond midback; remainder of back, sides of body, thighs, legs, and proximal 5-16 cm of dorsal and ventral surface of tail buffy (pheomelanin) agouti; remainder of tail blackish; neck, chest, and belly varying from dominantly buffy agouti to dominantly blackish *Saguinus nigricollis graellsii* Jiménez de la Espada.
2. Nape and mantle nearly or entirely uniformly blackish (eumelanin), the mantle usually tapered behind and extending to lower back; sacral region and dorsal surface of tail with proximal 3-5 cm marbled or striated reddish (pheomelanin) and blackish; ventral surface of tail base, rump, and legs dominantly or nearly entirely reddish or mahogany, remainder of tail blackish; neck, chest, and belly blackish, often mixed with reddish or mahogany *Saguinus nigricollis nigricollis* Spix.
3. Nape and mantle nearly uniformly blackish, the mantle tapered behind to midback with the blackish continued, usually as a mid-dorsal band or stripe, across lower back and proximal portion of tail; sides of lower back mixed blackish and orange (pheomelanin), sides and ventral surface of proximal 5-10 cm of tail orange agouti, remainder of tail blackish; neck and chest dominantly orange agouti, belly mixed orange and blackish *Saguinus nigricollis hernandesi*, new subspecies.

SAGUINUS NIGRICOLLIS

SAGUINUS FUSCICOLLIS



nigricollis

hernandezii

graellsi

Fig. 1. Color patterns of upper parts of subspecies of black-mantle tamarin, *Saguinus nigricollis*, and of saddle-back tamarin, *Saguinus fuscicollis* (based on *S. f. lagonotus* sympatric with *S. nigricollis graellsi*); modified from Hershkovitz (1966, 1967).

Saguinus nigricollis hernandezi, new subspecies

Saguinus fuscicollis.—Izawa (not Spix), 1975:304, Fig. 5 (animal on tree trunk eating resin); COLOMBIA: *Caquetá* (Río Peneya); behavior (food, feeding).—Izawa, 1976:384; COLOMBIA: *Caquetá* (Río Peneya); behavior (social groups, group sizes).

Saguinus nigricollis.—Hernández Camacho in Hershkovitz, 1977:1021; COLOMBIA: *Caquetá* (Curiplaya, Río Caquetá).—Izawa, 1978:241, 274, fig. 4 (allogrooming), fig. 5 (autogrooming), fig. 6 (chest gland marking); COLOMBIA: *Caquetá* (Río Peneya); ecology; behavior (88 day study between August 1975 and February 1976); reidentification of *Saguinus fuscicollis*, Izawa (1975, 1976).

Saguinus nigricollis cf. *graellsi*.—Hershkovitz, 1977:1021; COLOMBIA: *Caquetá* (Río Peneya); reidentification of "*Saguinus fuscicollis*," Izawa (1975, 1976).

Holotype.—Adult female, flat untanned skin only with hands and feet missing, Field Museum of Natural History no. 123380; collected 1974 by Tsuyoshe Watanabe (original number 23), at Río Peneya, a small tributary of the Río Caquetá entering from left (north) about 15 km above mouth of Río Caguán and about 50 km in straight line below village of La Tagua, Intendencia de Caquetá, Colombia; altitude approximately 150 m above sea level.

Paratypes.—Two flat untanned skins with hands and feet missing, Field Museum of Natural History nos. 123379 ♂, 123381 ♀, collected 1974 at Río Peneya by T. Watanabe; one round skin, Instituto de Ciencias Naturales Universidad Nacional de Colombia, Bogotá, no. 3572, collected January 1960 at Curiplaya, Río Caqueta, by F. Medem and H. Granados.

Distribution.—Eastern Colombia between Ríos Caquetá, Caguán and Orteguzaza and base of the Cordillera Oriental, Intendencia de Caquetá; altitudinal range, 150 to 500 m above sea level.

Coloration of holotype.—Forehead and crown blackish; mantle, throat and neck blackish, the hairs with one or two narrow orange subterminal bands, base of those on neck and throat whitish; temporal and genal regions contrastingly paler than crown, hairs with terminal half blackish, basal half buffy to nearly whitish and showing through as pale brown or drab; short hairs surrounding mouth and nostrils gray; blackish mantle tapering to midback and continuing as a middorsal band to tail base and along proximal 8–9 cm of tail; remainder of tail entirely blackish; sides of lower half of back modified agouti, the broad orange subterminal band of hairs giving a striated or marbled appearance; subterminal band of lateral fringe hairs paler and narrower; arms, legs, rump, sides of body and ventral surface of proximal 8–9 cm of tail finely banded orange agouti, the individual hairs with two orange bands; dark femoral patch indistinct; wrists and ankles blackish; hands and feet missing but undoubtedly blackish as in the species; terminal half of hairs of chest mixed orange agouti, saturate orange or saturate brownish, of belly mixed orange and blackish; skin of face moderately pigmented; remaining skin unpigmented.

The four skins of the type series are practically indistinguishable.

Measurements.—Those of holotype, a skin only, taken by collector: Head and body, 220, tail, 340, hind foot, 63; ear 27; weight, 500 g. Paratypes without morphometric data.

Comparisons.—*Saguinus nigricollis hernandezi* differs from both *S. n. graellsi*

and *S. n. nigricollis* by a blackish, more or less uninterrupted middorsal band on lower back and proximal portion of tail, and by mainly orange tone of saturate hairs or pheomelanin bands of individual agouti hairs. Indication or tendency toward middorsal band or stripe is not evident in *graellsi* or *nigricollis* and the pheomelanin tone is mainly buffy in *graellsi*, reddish or mahogany in *nigricollis*.

Saguinus n. hernandezi more nearly resembles *nigricollis* than *graellsi* in its darker, tapered mantle, more broadly banded or striated sides of lower half of back, and more saturate, less agouti, eumelanin of arms and underparts. On the other hand, *hernandezi* more nearly resembles *graellsi* than *nigricollis* in its shorter mantle, finely banded agouti hind limbs, and more extensive agouti of proximal portion of tail.

Remarks.—*Saguinus nigricollis hernandezi* is intermediate between *graellsi* and *nigricollis* with respect to color of all chromogenetic fields except for separation of the modified agouti of lower back by a more or less defined eumelanin middorsal band that continues across proximal portion of tail. In effect, *hernandezi* can be derived from a primitive buffy agouti *graellsi* type but has diverged beyond the point where it could give rise to a *nigricollis* type. In the latter, the saturate eumelanin of lower back does not extend posteriorly as a stripe to or beyond tail base but instead tends to spread laterally across sides of trunk.

The three flat untanned skins of *hernandezi* from Río Peneya represent the tamarins recorded by Izawa (1975, 1976) as *Saguinus fuscicollis*. The samples sent to the Field Museum for identification in July 1977 by Dr. Tsuyoshe Watanabe, who collaborated in the field with Dr. Kosei Izawa, were identified by me (1977:1021) as *Saguinus nigricollis* near *graellsi*. Izawa (1978:241) accepted this determination in his third and final report on the ecology and behavior of the black-mantle tamarin. The saddle-back tamarin, *Saguinus fuscicollis* was not seen by Izawa on the north bank of the Río Caquetá in the Río Peneya basin. Differences in color pattern between *S. fuscicollis* and the larger *S. nigricollis* are shown in Figs. 1 and 2.

Specimens examined.—Four, the holotype and paratypes.

Subspeciation: A Hypothetical Reconstruction

Phenetic and distributional patterns (Figs. 1, 2, 3) of the subspecies of *Saguinus nigricollis* suggest that during an early Recent or Late Pleistocene dry period, the forest habitat of the ancestral form of the species had contracted from a possible maximum between the Rios Amazonas-Solimões and Caquetá-Japurá to a strip along the base of the Cordillera Oriental in northern Ecuador and southern Colombia (cf. van der Hammen 1974). Fragmentation of this forest tract with isolation of the Ecuadorian populations from those in Colombia, could result in the differentiation of two groups. The Ecuadorian group evidently retained with slight modification the primitive agouti pattern of the ancestral form, whereas the Colombian isolates became more saturate with dominance of eumelanin on forequarters and pheomelanin on hindquarters, the tail excepted. Secondary separation of the Colombian stock into two subgroups gave place to divergence of *S. n. nigricollis* and *S. n. hernandezi*. The latter retains more of the ancestral agouti pattern particularly on hindquarters, but the blackish middorsal band of lower back and proximal upper surface of tail is *sui generis*.

With advent of a warmer and more humid climate, dispersal of the three dif-

Saguinus nigricollis Group

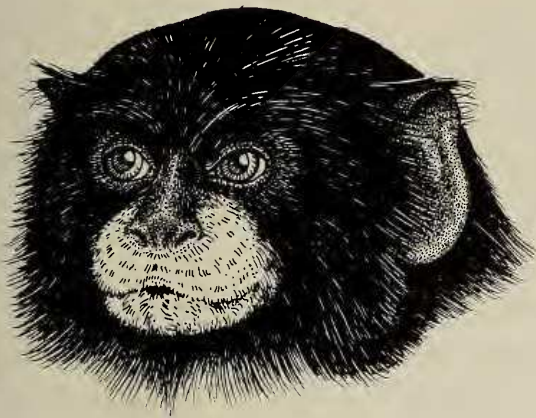
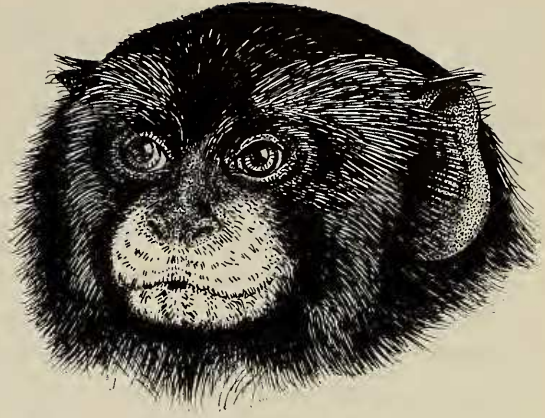
*S. fuscicollis**S. nigricollis*

Fig. 2. Facial color patterns of species of *Saguinus nigricollis* group. Contrasting pale brown temporal and genal regions, constant features of *S. nigricollis*, are not present in *S. fuscicollis*.

ferentiated forms of *Saguinus nigricollis* does not appear to have coincided *pari passu* with spread of the sylvan habitat from its near-cordilleran base to the banks of the Amazonas. Possible explanations are discussed beyond.

Geographic Distribution of the Subspecies of
Saguinus nigricollis

The range of *Saguinus nigricollis graellsii* in eastern Ecuador and northeastern Peru extends from the Río Sucumbios-Putumayo at the northwestern boundary between Ecuador and Colombia, east to the Ríos Güepi and Lagartococha, south through the Río Aguarico basin into the right bank basin of the Río Napo, thence south from between the river and foothills of the Cordillera Oriental to the north bank of the Marañón-Amazonas in Peru; altitudinal range is from about 100 m to 600 m or more above sea level.

All locality records of museum-preserved specimens lie north of the disputed boundary between Ecuador and Peru (Fig. 3) except for a point opposite Tarapoto, Río Napo (4), the mouth of the Río Curaray (4), and Destacamento (now Francisco Orellana) at the mouth of the Río Napo (5).

As hypothesized in the preceding section, *Saguinus nigricollis graellsii* dispersed to the east and south as its forest refuge expanded from the cordilleran base in northern Ecuador to the Marañón-Amazonas. Primary dispersal routes were forests spreading along the banks of the Ríos Napo, Tigre and Pastaza. *Sanguinus n. graellsii* gained the Río Amazonas via the right bank of the Río Napo but is otherwise unknown in Peru. However, scientific studies or collections of mammals have not been reported from the northern halves of the Ríos Tigre and Pastaza basins in the territory between the Marañón and the Ecuadorian-Peruvian boundary.

The geographic range of *graellsii* shown in Fig. 3 as questionably extending to the north bank of the Marañón is presumptive. The superficially similar *Callimico goeldii* was unknown on the north bank until 1970. The earliest published record

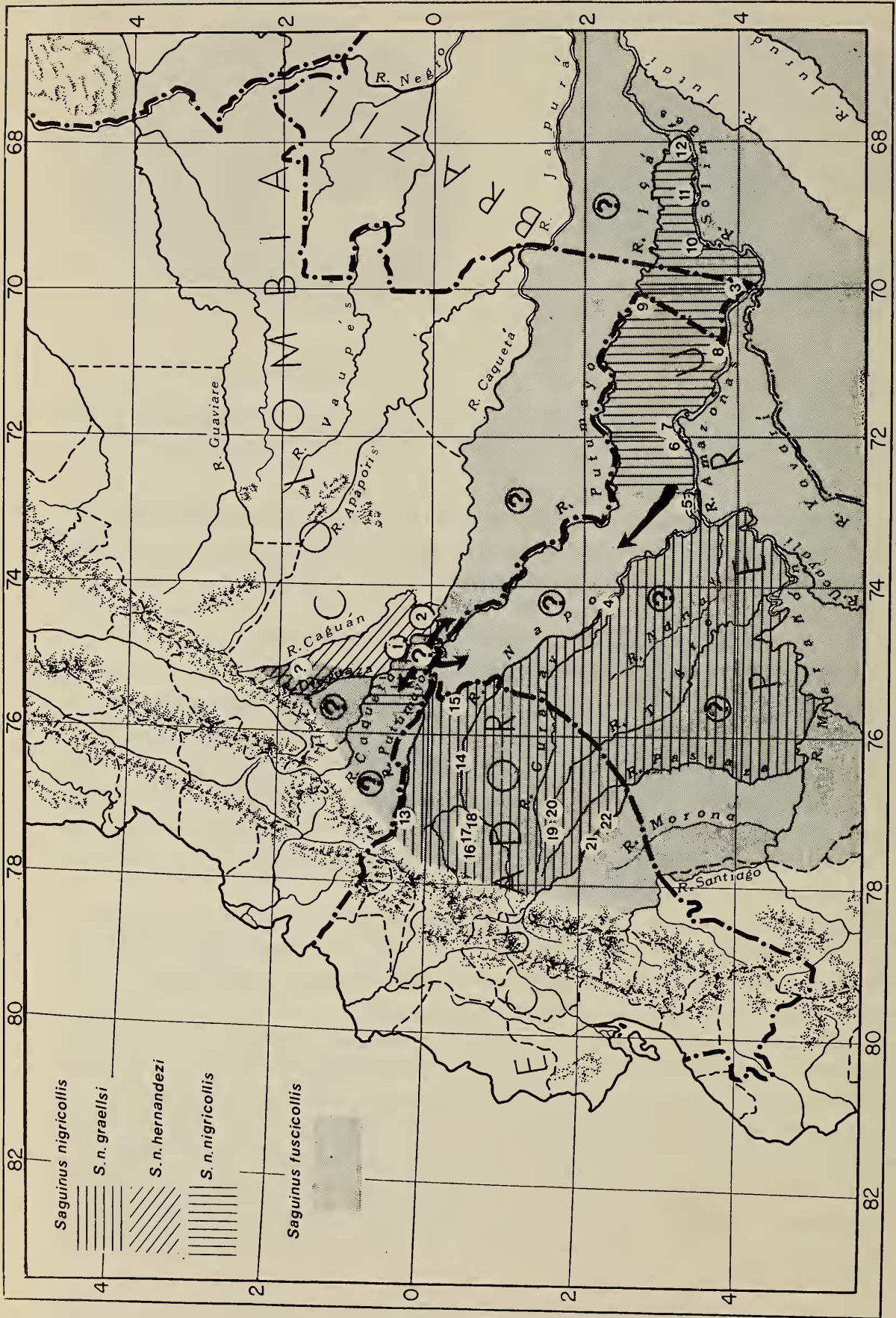


Fig. 3. Geographic distribution of subspecies of *Saguinus nigricollis* (hachured) and northwestern races of *Saguinus fuscicollis* (shaded). Numbers represent collecting localities of *Saguinus nigricollis* (see gazetteer). Question mark on white circle with arrows pointing in three directions is locale of *S. n. nigricollis* specimen labelled "Caquetá-Putumayo." Arrows point to highly probable extensions of known range of *Saguinus nigricollis*; question marks (?) indicate areas probably inhabited by *S. nigricollis*.

for Colombia is 1968, and *Callimico* has yet to be recorded from Ecuador where it surely occurs. For history and distribution of *Callimico*, see Hershkovitz (1977: 864, 892, 904).

If cryptic habits do not explain the apparent absence of *Saguinus nigricollis graellsii* west of the Río Napo basin in Peru, perhaps lack of suitable habitat not previously occupied by potential competitors is the answer. Much of the region between the lower Ríos Napo and Pastaza is black water swamp and floodland where the slightly smaller saddle-back tamarin, *Saguinus fuscicollis lagonotus*, abounds. This representative of the most wide-spread callitrichid species can be derived from an ancestral stock resembling *Saguinus fuscicollis illigeri* of the south bank of the Marañón by a modification of the mantle from primitive agouti to saturate pheomelanin. Presumably, the *lagonotus* founder colony became isolated from the *illigeri*-like parental form by a river bend cutoff with passive transfer to the north bank of the Marañón. Northern dispersal of the differentiated *S. fuscicollis lagonotus* may have excluded *S. nigricollis graellsii* from the lower halves of river basins shared in their upper halves by both species but where habitats are particularly favorable for *S. n. graellsii*.

Preserved specimens of *Saguinus nigricollis graellsii* from Colombia are unknown to me. Reports of *graellsii* seen north of the Ecuadorian border (see Hershkovitz 1977:629, 1021 for discussion) may refer to another kind of tamarin, perhaps *Saguinus nigricollis nigricollis* or *S. n. hernandezi*.

Saguinus nigricollis nigricollis has been known to inhabit the region between the Rio Amazonas-Solimões and the Río Putumayo-Içá from the mouth of the latter in Brazil to the mouth of the Río Napo in Peru. The geographic range, however, probably comprises the entire region between the Ríos Napo and Putumayo in Peru upstream to the Río Lagartococha-Aguarico at the Ecuadorian-Peruvian border. It may also include the interfluvial basin between the Ríos Putumayo-Içá and Caquetá-Japurá from the north shore of the Amazonas-Solimões to near the base of the Cordillera Oriental in Colombia. The altitudinal range is about 90 m to 400 m above sea level.

Delineation of the presumptive maximum range of *Saguinus nigricollis nigricollis* derives solely from the skin of a young individual labelled "Caquetá-Putumayo," an area identified in Fig. 3 by vertical hatching with an interrogation sign on a white circle with arrows pointing in three directions. The specimen, collected "January 1960," by H. Granados and H. Arévalo, is indistinguishable from Rio Amazonas-Solimões *Saguinus nigricollis nigricollis*. These data prove that the geographic range of *S. n. nigricollis* in the upper half of the watershed embraced by the Ríos Putumayo and Caquetá closes the geographic gap between the range of *S. n. graellsii* and *S. n. hernandezi*. The locality record "Caquetá-Putumayo" also indicates that, as far as known, upstream populations of *nigricollis* are isolated from downstream sister populations between the lower Río Putumayo-Içá and Rio Amazonas-Solimões. Had Granados and Arévalo taken Spix's black-mantled tamarin on the right bank of the Río Putumayo where on "January 1960" they also collected *Callimico goeldii* at Quebrada del Hacha (Hershkovitz 1977:926), the range of *S. n. nigricollis* would not appear disjunct. This hypothetical eventuality would leave the range of *S. n. hernandezi* discontinuous with respect to those of *graellsii* and *nigricollis*.

The authenticity of the "Caquetá-Putumayo" record is not questioned but it may be premature to extrapolate the enormous extension of the geographic range of *Saguinus nigricollis nigricollis* indicated by this datum alone. This species has not been collected or observed between the Ríos Putumayo and Caquetá by others including Humboldt, Lako and Salachi, Erikson, Hershkovitz, Moynihan, and Izawa (Hershkovitz 1977:643, 926, 932, 1038). Watanabe collected only the saddle-back tamarin, *Saguinus fuscicollis fuscus* between the Ríos Putumayo-Içá and Caquetá-Japurá (actually, right bank Río Caquetá and El Cedral above Puerto Asis, specimens in the Field Museum).

The range of *Saguinus nigricollis nigricollis* (Fig. 3) is separated from that of *S. n. graellsii* by the Río Napo and its tributary the Río Lagartococha-Aguarico, and from that of *S. n. hernandezi* by the upper Río Caquetá. *Saguinus n. nigricollis* is parapatric with the saddle-back tamarin *S. fuscicollis nigrifrons* along the Río Amazonas and *S. fuscicollis fuscicollis* along the Solimões. It is sympatric with *Saguinus fuscicollis tripartitus* between the Ríos Napo and Putumayo (Puerto Nariño, Río Amazonas, Hernández Camacho and Cooper 1976:39). If the range of *nigricollis* extends to the Río Caquetá, then it is also sympatric with *S. fuscicollis fuscus* and parapatric with the mottled-face tamarin *Saguinus inustus* along the Caquetá between the Ríos Caguán and Apaporis (see below).

Saguinus nigricollis hernandezi occurs between the Ríos Caquetá, Caguán, Orteguzza and base of the Cordillera Oriental in the Intendencia de Caquetá, eastern Colombia. The range very likely includes the segment between the Ríos Caquetá and Orteguzza. Altitudinal range is from about 150 m to 500 m above sea level.

Saguinus nigricollis hernandezi is sympatric with the saddle-back tamarin, *S. fuscicollis fuscus*, parapatric with *S. n. nigricollis* along the Río Caquetá and possibly with the mottled-face tamarin *S. inustus* along the Río Caguán. According to Thomas R. Defler (personal communication, March 1981), *S. inustus* occurs in the region between the Ríos Apaporis and Caquetá, but his records are of individuals seen and collected along the Río Miritiparaná, a left bank tributary of the Río Caquetá near the Brazilian border. The range of *Saguinus inustus* possibly extends west to the Río Caguán.

Attribution and Acknowledgments

The northernmost race of the black-mantle tamarin is named in honor of Dr. Jorge Hernández Camacho, one of Colombia's most respected biologists and perhaps one of the last of South America's authentic naturalists. Investigators of Colombian biota have found Jorge's expertise in their particular discipline, no matter which, an enormous asset unstintingly placed at their service and much of their success is owed to his advice, guidance and practical assistance in both his private and official capacities.

I take this occasion to express my gratitude to Dr. Hernández for a critical reading of page proof of most of the text of volume 1 of my (1977) *Living New World Monkeys*. The value of his contributions to the accuracy, clarity and objectives of the book are inestimable. It seems, however, that my note of appreciation on page xiii of page proof of the already locked in "Introduction" to the volume (see Index, p. 1056) was deleted for replacement by the later submitted "Corrigenda."

The three Río Peneya skins described here as *Saguinus nigricollis hernandezi* were received by the Field Museum of Natural History from Tsuyoshe Watanabe of the Primate Research Institute, Inuyama, Japan, in exchange for the identifications. Loan of the paratype of *S. nigricollis hernandezi* (ICN 3572) and the skin of *S. nigricollis nigricollis* (ICN 3556) from "Caquetá-Putumayo" by authorities of the Instituto de Ciencias Naturales of Bogotá, is acknowledged with thanks. Figure 1 was drawn by Field Museum staff artist Marlene Warner. Technical assistance and typing of the manuscript was provided by Barbara Brown.

Preparation of this report was aided in part by a grant (RR01226) from the National Institutes of Health.

Literature Cited

- Hernández Camacho, Jorge, and Robert W. Cooper. 1976. The nonhuman primates of Colombia.—In R. W. Thorington, Jr. and P. G. Heltne (eds.), *Neotropical primates. Field studies and conservation*.—National Academy of Sciences, Washington DC, pp. 35–69, 13 figs.
- Hershkovitz, Philip. 1966. Taxonomic notes on tamarins, genus *Saguinus* (Callithricidae, Primates), with descriptions of four new forms.—*Folia Primatologia* 4:381–395, 4 figures.
- . 1977. *Living New World Monkeys (Platyrrhini) with an introduction to primates. Volume 1*. University of Chicago Press, Chicago, pp. xiv + 1117, 520 figs., 7 color plates.
- Izawa, Kosei. 1975. Foods and feeding behavior of monkeys in the upper Amazon basin.—*Primates* 16(3):295–316, 8 figures.
- . 1976. Group sizes and composition of monkeys in the upper Amazon basin.—*Primates* 17(3):367–399, 6 figures.
- . 1978. A field study of the ecology and behavior of the black-mantle tamarin (*Saguinus nigricollis*).—*Primates* 19(2):241–274, 9 figures.
- van der Hammen, T. 1974. The Pleistocene changes of vegetation and climate in tropical South America.—*Journal of Biogeography* 1:3–26, 21 figures.

Field Museum of Natural History, Roosevelt Road at Lake Shore Drive, Chicago, Illinois 60605.

Gazetteer of Collecting Localities of *Saguinus nigricollis* Shown in Fig. 3

COLOMBIA

Caquetá—*Saguinus nigricollis hernandezi*

1. Curiplaya, Río Caquetá, 0°16'N, 74°52'W. F. Medem and H. Granados, January 1960.
2. Peneya (Río), mouth N side Río Caquetá, 0°07'S, 74°22'W—type locality. Observations by K. Izawa at Puerto Japón, 0°7'N, 74°24'W, and Puerto Tokio, 0°12'N, 74°23'W, August 1975–February 1976. Collection by T. Watanabe, 1974.

Amazonas—*Saguinus nigricollis nigricollis*

3. Leticia, Río Amazonas, 4°15'S, 69°56'W. J. N. Layne, February 1956 at 100 m. G. Erikson (purchased).

"Caquetá-Putumayo"—*Saguinus nigricollis nigricollis*

? Locality between Ríos Caquetá and Putumayo where boundaries of the two Intendencias of the same names approach or could not be determined at point of collection. H. Granados and H. Arévalo, January 1960.

PERU

Loreto—*S. n. graellsii* and *S. n. nigricollis*

4. Tarapoto (opposite), Río Napo, 2°15'S, 74°06'W—type locality of *Saguinus nigricollis graellsii*. M. Jiménez de la Espada, June, July 1865.
4. Curaray (Río), boca (=mouth) at Río Napo, 2°22'S, 74°05'W—*Saguinus nigricollis graellsii*. Olalla and Sons, October, November, December 1925 at 140 m.

5. Destacamento (=Francisco Orellana), Río Napo, at junction with Río Amazonas, 3°21'S, 72°45'W—*Saguinus nigricollis graellsii*. M. Jiménez de la Espada, 1865.
6. Apayacu (Río), mouth at Río Amazonas, 3°21'S, 72°07'W, at 100 m—*Saguinus nigricollis nigricollis*. Olalla and Sons, December 1926, January 1927.
7. Ampiyacu, Río Amazonas, 3°19'S, 71°51'W—*Saguinus nigricollis nigricollis*. C. Freese, October, November, 1974 (sight records).
7. Pebas, Río Amazonas, 3°10'S, 71°48'W—*Saguinus nigricollis nigricollis*. Castelnau and Deville, about 1847; Olalla and Sons, October, 1926; R. W. Hendee, January 1928 at 91 m.
8. Chimbote (opposite), Río Amazonas, 3°49'S, 70°41'W—*Saguinus nigricollis nigricollis*.
9. Yahuas Territory, see Santa María de Las Yaguas.
9. Santa María de Las Yaguas, near Río Putumayo at Colombian border, 2°43'S, 69°58'W—*Saguinus nigricollis nigricollis*. J. J. Mounsey, August 1913.

BRAZIL—*Saguinus nigricollis nigricollis*

Amazonas

10. Santa Rita, Rio Solimões, 3°30'S, 69°20'W. W. Ehrhardt, September 1926.
11. São Paulo de Olivença, Rio Solimões, 3°27'S, 68°48'W (type locality). Spix and Martius Expedition.
12. Between Rio Solimões and Rio Içá. Spix and Martius Expedition.

ECUADOR—*Saguinus nigricollis graellsii*

Napo

13. Santa Rosa de Sucumbios, Río San Miguel, right bank tributary of Río Putumayo, 0°15'N, 76°27'W. Olalla, November 1931.
14. San Francisco, Río Napo, 0°30'S, 76°22'W. P. Hershkovitz, February, March, 1936, at 200 m.
15. Lagarto Cocha (Río), mouth at Río Aguarico, 0°39'S, 75°16'W. Olalla and Sons, January 1926, at 190 m.
16. Sumaco, 0°34'S, 77°30'W. Olalla and Sons, December 1923, January 1924.
17. Avila, 0°38'S, 77°25'W, at 600 m. W. Clark-McIntyre, May 1937; A. Olalla, September 1938.
17. San José (below), Río Suno, 0°31'S, 77°25'W. Olalla and Sons, March, April 1924.
18. Suno (Río), 0°42'S, 77°08'W. Olalla Brothers, 1923, March 1924, February 1929.

Pastaza

19. Yana Rumi (Río), mouth at Río Pindo Yacu, 1°38'S, 76°59'W. R. Olalla, December 1934, February 1935.
20. Pindo Yacu (Río), joins Río Cunambo, upper Río Tigre at 2°08'S, 76°04'W. R. Olalla, October, 1934, above junction with Río Cunambo at 250 m.
21. Pastaza (Río), 2°05'S, 500 m. C. S. Webb.
22. Capahuara or Capihuara (Río), mouth at Río Pastaza, 2°3'S, 76°51'W. R. Olalla, November 1934, above mouth at 300 m.